Specimen Question **Annexure-XXXIX**

DO NOT OPEN THE SEAL UNTIL YOU ARE TOLD TO DO SO

QP-FSL-2024 **Question Booklet No.**

FORENSIC CHEMISTRY

PAPER—III

Test Booklet Series

A

Time Allowed : 1 Hour 30 Minutes **Maximum Marks : 150**

INSTRUCTIONS FOR CANDIDATES

1. Immediately after the commencement of the examination, you should check that this Test Booklet ***does not*** have any unprinted or torn or missing pages or questions etc. If so, get it replaced by a complete Test Booklet.

2. Write your Roll Number on the Test Booklet in the Box provided alongside.

3. This Test Booklet contains **150** questions. Each question comprises of four responses (answers) within as (A), (B), (C) and (D). You should select the response which you feel is the most ***correct*** and mark it on the OMR Answer Sheet.

4. You have to mark all your responses **ONLY** on the separate **OMR Answer Sheet** provided. Also read the directions in the **OMR Answer Sheet**. Fill in all the entries in the OMR Answer Sheet ***correctly***. **DO NOT WRITE/MARK ANYTHING EXCEPT IN THE SPACE PROVIDED FOR IT,** failing which your OMR Answer Sheet ***shall not*** be evaluated.

5. **Count** the number of **questions attempted** carefully and write it down in the space provided **in the OMR Answer Sheet**.

6. After you have completed filling in all your responses on the **OMR Answer Sheet** and the examination has concluded, **you should hand over** to the Invigilator **only the OMR Answer Sheet (in original). You are permitted to take away 2nd Copy of the OMR Answer Sheet and Test Booklet**.

7. Each question carries 1 mark.

8. Candidature would be cancelled in case of non-compliance with any of these instructions.

9. **Penalty for wrong answers :**

   THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

   (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, 0·5 mark of the marks assigned to that question will be deducted as penalty.

   (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

   (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no penalty for that question.

10. **"Mobile phones, calculators, IT gadgets, smart watch and any other electronic devices such as Bluetooth etc. are not allowed inside the premises where the examination is being conducted. Any infringements of these instructions shall entail disciplinary action including ban from future examinations."**

SEAL

DO NOT OPEN THE SEAL UNTIL YOU ARE TOLD TO DO SO

1. Breathalyzers measure Blood Alcohol Content (BAC) based on the principle of

(A) redox reaction

(B) oxidation of ethanol to acetic acid

(C) reduction of acetic acid to ethanol

(D) UV absorption of ethanol molecules

2. The term 'ABV' on an alcoholic beverage label stands for

(A) Alcohol by Vapour

(B) Absolute Beverage Volume

(C) Alcohol by Volume

(D) Alcoholic Beverage Volume

3. The primary color reagent used to detect ethanol in alcoholic beverages is

(A) potassium permanganate

(B) sodium dichromate

(C) silver nitrate

(D) sodium thiosulfate

4. Which of the following colorimetric reagents is used in the potassium permanganate test to detect aldehyde impurities in liquor?

(A) Acetone

(B) Potassium dichromate

(C) Nessler's reagent

(D) Sodium hydroxide

5. Which of the following is a primary instrumental technique for detecting toxic metals in alcohol samples?

(A) Mass Spectrometry (MS)

(B) Atomic Absorption Spectroscopy (AAS)

(C) High-Performance Liquid Chromatography (HPLC)

(D) Nuclear Magnetic Resonance (NMR)

6. Which of the following substances is added to detect adulteration of alcohol in low-quality or illegal liquor?

(A) Sugar

(B) Color dyes

(C) Fusel oils

(D) Denatonium benzoate

7. Which type of evidence is commonly analyzed using forensic chemistry at a drug-related crime scene?

(A) Fingerprints

(B) Chemical residues

(C) Ballistics evidence

(D) Shoeprints

8. The Reid Vapor Pressure (RVP) test is used to measure the

(A) flash point

(B) boiling point

(C) volatility of petrol

(D) sulfur content

9. The addition of which of the following compounds can increase the octane rating of petrol?

(A) Benzene

(B) Toluene

(C) Methanol

(D) Kerosene

10. The ASTM D4052 test is commonly used for determining the

(A) flash point of kerosene

(B) sulfur content in petrol

(C) density of lubricants

(D) vapour pressure of diesel

11. According to BIS, the acceptable water content in diesel fuel should be

(A) 0·01%

(B) 0·05%

(C) 0·1%

(D) 1%

12. According to BIS, the minimum flash point of kerosene is

(A) 23 °C

(B) 35 °C

(C) 40 °C

(D) 60 °C

13. The detection of particulate matter in adulterated engine oil can be performed using

(A) gas chromatography

(B) atomic absorption spectroscopy

(C) filtration and gravimetric analysis

(D) UV-visible spectroscopy

14. The presence of which of the following dyes in petrol can indicate adulteration with a lower-grade fuel?

(A) Sudan III

(B) Eosin Yellow

(C) Solvent Blue 35

(D) Methyl Orange

15. Which of the following chemical tests is commonly used to detect the presence of starch in milk?

(A) Benedict's test

(B) Iodine test

(C) Biuret test

(D) Tollens' test

16. Which of the following methods is effective for detecting artificial colorants in milk products?

(A) Thin-layer Chromatography (TLC)

(B) Gerber method

(C) pH testing

(D) Tollens' test

17. Which of the following methods is often used to evaluate the purity of butter by analyzing its fatty acid composition?

(A) Iodine Value Test

(B) Gas Chromatography (GC)

(C) Refractive Index Measurement

(D) Lactometer Test

18. What does a low iodine value indicate about an oil?

(A) High degree of unsaturation

(B) Low degree of unsaturation

(C) High peroxide content

(D) High acid value

19. The saponification value of an oil or fat is a measure of

(A) degree of unsaturation

(B) free fatty acid content

(C) average molecular weight of fatty acids

(D) number of impurities

20. Which of the following is a common immediate effect of an acid attack?

(A) Difficulty in breathing

(B) Deep tissue burns and blisters

(C) Loss of consciousness

(D) Excessive bleeding from the mouth

21. In forensic chemistry, how is the detection of phenolphthalein used to determine the presence of blood?

(A) By reacting with the hemoglobin in blood

(B) By turning red in the presence of blood

(C) By detecting an acid-base reaction in blood

(D) By identifying the blood type

22. Which of the following is a major advantage of Thin-layer Chromatography (TLC) in forensic chemistry?

(A) High sensitivity for detecting low concentrations

(B) Ability to separate complex mixtures rapidly

(C) Ability to identify molecules based on molecular weight

(D) High resolution for detecting colorless compounds

23. What is the typical burn pattern found at an arson scene caused by an accelerant?

(A) A V-shaped pattern of burn marks

(B) A circular pattern of burn marks

(C) Uniform burn marks with no specific pattern

(D) Irregular burn marks with a distinct trail

24. Which of the following is the most common characteristic of a fire caused by an accelerant such as gasoline or kerosene?

(A) The fire burns slowly and smolders for a long time

(B) The fire exhibits a uniform burn pattern

(C) The fire produces a dark, oily residue

(D) The fire burns with a distinct chemical smell

25. Which significant hazard is associated with atomic explosions compared to chemical explosions?

(A) Lower release of energy

(B) The production of radioactive fallout

(C) A lack of visible damage

(D) No heat generated

26. Which of the following is ***not*** a type of chemical explosive?

(A) Dynamite

(B) TNT (Trinitrotoluene)

(C) Nitroglycerin

(D) Uranium-235

27. Which of the following is the role of a timer in an IED?

(A) To remotely trigger the device

(B) To prevent premature detonation

(C) To amplify the explosion

(D) To store the explosive energy

28. Which of the following materials is commonly used as the explosive charge in an IED?

(A) TNT (Trinitrotoluene)

(B) Potassium nitrate

(C) Ammonium nitrate

(D) Chlorine gas

29. Which of the following methods is commonly used for the extraction of explosive residues from a surface?

(A) Soxhlet extraction

(B) Solid-Phase Microextraction (SPME)

(C) Liquid-liquid extraction

(D) Swabbing with solvent-soaked wipes

30. What role does the Fourier Transform Infrared Spectroscopy (FTIR) play in the analysis of explosion residues?

(A) It detects the presence of explosive gases in the atmosphere

(B) It measures the physical properties of explosive fragments

(C) It identifies the molecular structure of chemical compounds in residues

(D) It detects the heat released during the explosion

31. Which of the following is classified as a nerve agent used in chemical warfare?

(A) Phosgene

(B) Sarin

(C) Mustard gas

(D) Chlorine gas

32. Lewisite is classified as which type of chemical warfare agent?

(A) Nerve agent

(B) Blister agent

(C) Blood agent

(D) Choking agent

33. The Chemical Weapons Convention (CWC), which aims to eliminate the use and production of chemical weapons, was signed in which year?

(A) 1945

(B) 1972

(C) 1993

(D) 2005

34. What was the primary mechanism of action for phosgene gas used as a chemical weapon during the World War I?

(A) Causes central nervous system damage

(B) Causes respiratory distress and suffocation

(C) Causes blistering of the skin

(D) Causes hallucinations

35. Which of the following is often analyzed in forensic cases related to lead poisoning?

(A) Copper

(B) Cadmium

(C) Lead

(D) Zinc

36. Which of the following elements, when present in high quantities in metal, may indicate that the metal originated from a specific geographic region?

(A) Iron

(B) Lead

(C) Strontium

(D) Titanium

37. Which of the following information is ***not*** a part of BIS hallmark on gold jewellery?

(A) BIS logo

(B) Fineness or purity mark (e.g., 916 for 22K)

(C) Year of hallmarking

(D) Price of the jewellery

38. Which of the following precious metals other than gold is currently included in BIS mandatory hallmarking?

(A) Platinum

(B) Silver

(C) Copper

(D) Palladium

39. What is the significance of the jeweller's identification mark on a BIS hallmarked item?

(A) It denotes the jeweller's certification status

(B) It ensures the uniqueness of the jewellery design

(C) It identifies the jeweller responsible for the purity

(D) It shows the purity of the metal used

40. In forensic toxicology, which of the following poisons has the shortest shelf life, making it harder to detect in the body?

(A) Arsenic

(B) Cyanide

(C) Lead

(D) Methanol

41. Which of the following toxic substances is commonly detected by using the Marsh test in forensic toxicology?

(A) Cyanide

(B) Arsenic

(C) Methanol

(D) Carbon monoxide

42. What is the most commonly used on-the-spot screening method for detecting drugs in body fluids such as urine?

(A) Gas Chromatography-Mass Spectrometry (GC-MS)

(B) Immunoassay

(C) High-Performance Liquid Chromatography (HPLC)

(D) Atomic Absorption Spectroscopy (ASS)

43. Which of the following substances is commonly used as an antidote for organophosphate poisoning?

(A) Atropine

(B) Activated charcoal

(C) Aspirin

(D) Sodium bicarbonate

44. Which color is observed when opium alkaloids react with Marquis Reagent in a forensic color test?

(A) Red

(B) Purple

(C) Blue

(D) Green

45. Which of the following plant-derived poisons causes convulsions and can be detected by microscopic analysis of plant seeds?

(A) Strychnine

(B) Nicotine

(C) Cyanide

(D) Aconitine

46. Which of the following is a commonly encountered plant poison in forensic cases in India?

(A) Ricin

(B) Methanol

(C) Arsenic

(D) Cyanide

47. Which of the following tests is commonly used to identify the specific animal origin of a poison in forensic investigations?

(A) Luminol test

(B) Precipitin test

(C) Kastle-Meyer test

(D) Rinne test

48. Which of the following components in snake venom causes blood clotting disorders and damage to blood vessels?

(A) Neurotoxin

(B) Hemotoxin

(C) Myotoxin

(D) Cardiotoxin

49. Which of the following is a common first aid treatment for a snakebite before reaching a medical facility?

(A) Applying a tourniquet above the bite site

(B) Applying ice directly on the bite

(C) Immobilizing the limb and keeping it below heart level

(D) Cutting the bite wound to drain venom

50. In forensic toxicology, which water-soluble drug is known for its stimulating effect and is frequently abused?

(A) Morphine

(B) MDMA (Ecstasy)

(C) Codeine

(D) LSD

51. Why is it easier to detect water-soluble drugs like morphine in urine samples than fat-soluble drugs?

(A) They are metabolized slowly

(B) They have longer half-lives

(C) They are excreted more quickly in urine

(D) They bind tightly to body fat

52. Which of the following factors can influence the formation of a stable drug-dye complex in complexometric analysis?

(A) Temperature

(B) Humidity

(C) Wavelength of light

(D) Presence of oxygen

53. Which of the following ptomaines is most commonly associated with the putrefaction of fish?

(A) Cadaverine

(B) Putrescine

(C) Trimethylamine

(D) Serotonin

54. Which of the following extraction methods is typically used for the separation of volatile compounds from liquid or solid matrices in forensic toxicology?

(A) Solid-phase extraction

(B) Gas chromatography

(C) Headspace extraction

(D) Soxhlet extraction

55. Which of the following extraction methods is commonly used for isolating non-polar drugs from biological matrices in forensic toxicology?

(A) Solid-Phase Microextraction (SPME)

(B) Liquid-solid extraction

(C) Liquid-liquid extraction

(D) Soxhlet extraction

56. Which of the following factors is critical in choosing an extraction method for forensic analysis?

(A) Color of the sample

(B) pH of the sample

(C) Molecular weight of the analyte

(D) All of the above

57. Which of the following is a key component of the SPE process?

(A) Filtration of the sample through a membrane

(B) Adsorption of analytes onto a solid-phase material

(C) Evaporation of the solvent

(D) Heating the sample to high temperatures

58. What is the primary application of Solid-Phase Microextraction (SPME) in forensic toxicology?

(A) Isolation of drugs from urine samples

(B) Detection of volatile compounds from air samples

(C) Extraction of DNA from biological tissues

(D) Isolation of non-volatile compounds from soil

59. Which of the following methods can be used to extract Volatile organic compounds (VOCs) from air samples in forensic toxicology?

(A) Soxhlet extraction

(B) Solid-Phase Extraction (SPE)

(C) Steam distillation

(D) Air sampling onto adsorbent traps

60. Which of the following is typically used as a reagent in wet digestion for forensic analysis?

(A) Sodium chloride

(B) Nitric acid

(C) Hydrochloric acid

(D) Both (B) and (C)

61. What is the primary advantage of dialysis in forensic chemistry?

(A) It separates analytes based on boiling points

(B) It allows selective separation of small molecules from large molecules

(C) It is used to isolate volatile compounds from liquids

(D) It enhances the extraction of non-volatile substances

62. What is the key reagent used in the Stas-Otto method for alkaloid extraction?

(A) Ammonium sulfate

(B) Sodium chloride

(C) Chloroform

(D) Ethanol

63. Which of the following is an advantage of using ammonium sulfate precipitation in forensic toxicology?

(A) It is effective in isolating volatile compounds

(B) It helps to remove interfering proteins and lipids

(C) It extracts alkaloids more efficiently than other methods

(D) It concentrates poisons from air samples

64. Which of the following drugs undergoes phase I metabolism primarily through the cytochrome P450 enzyme system in the liver?

(A) Cocaine

(B) Codeine

(C) Lidocaine

(D) All of the above

65. Which of the following drugs is known for undergoing significant first-pass metabolism, thus reducing the amount of the active drug reaching systemic circulation after oral administration?

(A) Aspirin

(B) Morphine

(C) Paracetamol (acetaminophen)

(D) Lidocaine

66. What is the primary route by which drugs like cocaine are eliminated from the body?

(A) Renal excretion

(B) Fecal excretion

(C) Sweat

(D) Expired air

67. Which of the following pharmacokinetic properties is most commonly measured to determine the duration and intensity of a drug's effect in the body?

(A) Half-life

(B) Bioavailability

(C) Volume of distribution

(D) Protein binding affinity

68. Which of the following is a common metabolite of methanol after its ingestion?

(A) Formaldehyde

(B) Acetaldehyde

(C) Acetic acid

(D) Methanol does not metabolize

69. Which of the following is the primary metabolic pathway for acetylsalicylate (aspirin)?

(A) Hydrolysis to salicylic acid

(B) Conversion to acetaminophen

(C) N-glucuronidation

(D) Dehydroxylation

70. Which of the following pesticides is metabolized into para-nitrophenol, a toxic metabolite?

(A) DDT

(B) Parathion

(C) Carbaryl

(D) Methoxychlor

71. What is the primary site of metabolism for thiopental (pentothal)?

(A) Kidneys

(B) Liver

(C) Lungs

(D) Heart

72. The metabolite of phenobarbital responsible for its sedative effects is

(A) phenylethanol

(B) p-hydroxyphenobarbital

(C) acetophenone

(D) 4-hydroxybutyric acid

73. Which of the following is a common advantage of LC-MS over GC-MS?

(A) Better suited for non-volatile compounds

(B) Higher resolution of volatile compounds

(C) Requires less sample preparation

(D) More cost-effective

74. What is the most common method used for detecting carbon dioxide (CO_2) in biological fluids?

(A) Gas Chromatography-Mass Spectrometry (GC-MS)

(B) Infrared Spectroscopy

(C) Electrochemical Sensors

(D) Fluorescence Spectroscopy

75. Which of the following techniques is commonly employed to detect ammonia (NH_3) in biological fluids?

(A) Gas Chromatography-Mass Spectrometry (GC-MS)

(B) Ion Selective Electrode (ISE)

(C) Fluorescence Spectroscopy

(D) Thin-layer Chromatography (TLC)

76. Which of the following metals is most commonly associated with the condition known as 'Minamata disease'?

(A) Lead

(B) Mercury

(C) Arsenic

(D) Cadmium

77. In case of antimony poisoning, which of the following treatments is commonly recommended?

(A) Chelation therapy with dimercaprol (BAL)

(B) Use of sodium bicarbonate

(C) Blood transfusions

(D) Administration of potassium iodide

78. What is the primary mechanism of action of organophosphate pesticides?

(A) Inhibition of acetylcholinesterase

(B) Blockage of sodium channels

(C) Disruption of mitochondrial function

(D) Inhibition of cytochrome P450 enzymes

79. Which of the following pesticides is considered as synthetic pyrethroid?

(A) Chlorpyrifos

(B) Deltamethrin

(C) Malathion

(D) Parathion

80. What is one of the main challenges while analyzing drugs in decomposed tissues?

(A) Drugs are absorbed into the bones

(B) Drugs often breakdown into simpler compounds

(C) Drugs accumulate in the liver only

(D) Drugs cause delayed symptoms which complicate diagnosis

81. What is the role of 'cadaverine' in the toxicological analysis of decomposed materials?

(A) It is a marker for cyanide poisoning

(B) It is a compound produced by the breakdown of fats

(C) It is a product of protein decomposition

(D) It is a toxic substance associated with heavy metal poisoning

82. Which of the following volatile substances is commonly formed during the decomposition of proteins in biological tissues?

(A) Acetone

(B) Methanol

(C) Putrescine

(D) Formaldehyde

83. Decomposition of biological tissues leads to the formation of which of the following substances that can be analyzed for toxicological purposes?

(A) Heavy metals

(B) Volatile fatty acids and amines

(C) Cyanide

(D) Inorganic salts

84. Which of the following Sections of the Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985, deals with the punishment for offenses related to the illegal import, export or manufacture of narcotic drugs and psychotropic substances?

(A) Section 15

(B) Section 20

(C) Section 27

(D) Section 31

85. Under the NDPS Act, the cultivation of cannabis plants for personal use is

(A) completely legal

(B) legal with a license

(C) illegal and punishable

(D) only allowed for medicinal purposes

86. Which of the following is a common method of treating drug addiction and dependence?

(A) Methadone maintenance therapy

(B) Increasing the dosage of the addictive substance

(C) Ignoring the psychological aspects of addiction

(D) Promoting the use of multiple drugs simultaneously

87. Which of the following is classified as a psychotropic substance under the NDPS Act?

(A) Heroin

(B) Cocaine

(C) LSD (Lysergic acid diethylamide)

(D) Opium

88. What is the primary difference between narcotic drugs and psychotropic substances under the NDPS Act?

(A) Narcotics affect the nervous system, while psychotropics affect the body's metabolism

(B) Narcotics are derived from plants, while psychotropics are synthetic

(C) Narcotics cause physical dependence, while psychotropics cause psychological dependence

(D) There is no difference between narcotic drugs and psychotropic substances

89. What is the punishment for possession of narcotic drugs under the NDPS Act for a quantity that is less than the commercial quantity but greater than the small quantity?

(A) Rigorous imprisonment for up to 6 months

(B) Fine or imprisonment for up to 2 years

(C) Imprisonment for up to 10 years

(D) Life imprisonment

90. Which of the following statements is ***true*** regarding synthetic narcotics like methadone and fentanyl?

(A) They are all derived from natural opium alkaloids

(B) They can be used to treat opioid addiction

(C) They have no medical use and are only abused

(D) They are less potent than natural opioids like morphine

91. The synthesis of heroin from morphine involves which of the following chemical modifications?

(A) Hydrolysis

(B) Methylation

(C) Acetylation

(D) Halogenation

92. Which of the following drugs is used for the treatment of opioid addiction and is considered a synthetic opioid?

(A) Fentanyl

(B) Buprenorphine

(C) Codeine

(D) Opium

93. Which of the following substances is commonly used to treat anxiety and insomnia and is classified as a benzodiazepine?

(A) Methaqualone

(B) Diazepam

(C) Phenobarbital

(D) Zolpidem

94. What is the primary use of Z-drugs like zolpidem and zaleplon in clinical practice?

(A) Treatment of depression

(B) Treatment of insomnia

(C) Treatment of anxiety

(D) Treatment of epilepsy

95. Which of the following is a common side effect of amphetamine abuse?

(A) Sedation and drowsiness

(B) Increased appetite and weight gain

(C) Increased heart rate and hypertension

(D) Decreased body temperature and coma

96. The primary mechanism of action of ephedrine in the body is

(A) inhibition of serotonin reuptake

(B) stimulation of dopamine release

(C) direct stimulation of alpha-adrenergic and beta-adrenergic receptors

(D) inhibition of GABA receptors

97. The primary psychoactive compound found in ganja (cannabis) is

(A) THC (Tetrahydrocannabinol)

(B) CBD (Cannabidiol)

(C) Psilocybin

(D) Mescaline

98. Charas, a form of cannabis, is primarily distinguished by which of the following?

(A) It is made by extracting the resin from cannabis flowers

(B) It is prepared from the seeds of the cannabis plant

(C) It is derived from the leaves of the cannabis plant

(D) It is chemically identical to ganja but in liquid form

99. Which of the following club drugs is commonly associated with causing memory loss and loss of motor skills and can be detected using microcrystal tests?

(A) MDMA (Ecstasy)

(B) Rohypnol (Flunitrazepam)

(C) Ketamine

(D) GHB (Gamma-Hydroxybutyrate)

100. In forensic drug analysis, why is hair testing preferred over other biological samples for detecting chronic drug use?

(A) Hair samples are easier to collect than blood or urine samples

(B) Hair can provide a long-term record of drug use over several months or years

(C) Hair analysis can provide a clear timeline when drugs were used

(D) Hair testing does not require specialized equipment

101. The detection window for drugs in nails is typically

(A) a few hours

(B) a few days

(C) a few weeks to months

(D) a few years

102. What is the primary advantage of using LC-MS (Liquid Chromatography-Mass Spectrometry) for drug analysis?

(A) Analyzes only non-volatile compounds

(B) Can analyze complex mixtures and provide structural information

(C) Only quantifies compounds without identifying them

(D) Limited to organic compounds

103. Which of the following techniques is commonly used to distinguish between isomers of a drug compound?

(A) Raman Spectrometry

(B) HPTLC

(C) GC-MS

(D) IR Spectrometry

104. What is the main advantage of using FTIR (Fourier Transform Infrared) over conventional IR Spectroscopy in drug analysis?

(A) Faster data collection and higher resolution

(B) Lower cost of operation

(C) Only works for gaseous samples

(D) Primarily used for metallic compounds

105. What does 'linearity' in method validation refer to?

(A) The method's ability to detect only linear molecules

(B) The method's response being directly proportional to the analyte concentration

(C) The method's ability to work without calibration

(D) The ability to measure curved responses accurately

106. In calibration of instruments, which of the following is generally used to create a calibration curve?

(A) Standard solutions of known concentrations

(B) Unknown samples solutions

(C) Distilled water only

(D) Uncalibrated instruments

107. Limit of Detection (LOD) in method validation refers to

(A) the highest concentration of analyte detectable

(B) the smallest concentration of analyte that can be reliably detected but not necessarily quantified

(C) the minimum concentration that can be accurately quantified

(D) the ability to detect impurities in the sample

108. What is the main purpose of adding diluents to NDPS drugs?

(A) To increase potency

(B) To increase volume and profit

(C) To enhance therapeutic effects

(D) To ensure quality control

109. Which of the following is a common visual indicator of adulterants in a sample of methamphetamine?

(A) Strong odor

(B) Crystalline form

(C) Cloudy appearance

(D) Fluorescent under UV light

110. In forensic toxicology, which of the following analytical methods is most sensitive for detecting low levels of adulterants in drug samples?

(A) High-Performance Liquid Chromatography (HPLC)

(B) Raman Spectrometry

(C) Mass Spectrometry

(D) Flame Atomic Absorption Spectroscopy

111. Which of the following types of microscope ***cannot*** be used for studying living cells?

(A) Light microscope

(B) Fluorescence microscope

(C) Scanning Electron Microscope

(D) Phase-contrast microscope

112. What is the primary purpose of accrediting a forensic laboratory?

(A) To increase the number of forensic experts

(B) To ensure the laboratory's compliance with professional standards

(C) To reduce the cost of forensic analysis

(D) To improve the speed of forensic case processing

113. The visible region of the electromagnetic spectrum stretches from

(A) 100-400 nm

(B) 400-700 nm

(C) 700-1000 nm

(D) 1000-1400 nm

114. A witness testifying about what they personally observed or experienced is providing

(A) hearsay evidence

(B) direct evidence

(C) circumstantial evidence

(D) documentary evidence

115. What does the term 'integrity of the chain of custody' refer to?

(A) Proper identification of suspects in a criminal investigation

(B) Ensuring that evidence remains secure, unaltered and traceable

(C) Documenting the training of forensic analysts

(D) The accuracy of witness testimonies

116. To identify the shape of univariate data, which type of graph would be most useful?

(A) Bar graph

(B) Line graph

(C) Histogram

(D) Scatter plot

117. Under which of the following categories are cannabis (COVA), hemp and opium defined?

(A) Narcotic Drugs and Psychotropic Substances Act

(B) Wildlife Protection Act

(C) Forest Conservation Act

(D) Drugs and Cosmetics Act

118. What is the purpose of staining in gel electrophoresis?

(A) To increase the speed of DNA migration

(B) To visualize the separated DNA or protein bands

(C) To alter the size of DNA fragments

(D) To create a uniform pH in the gel

119. In the context of spectroscopy, what is Rayleigh scattering?

(A) Scattering of light by particles much larger than the wavelength of light

(B) Absorption of light by atoms and re-emission at a different wavelength

(C) Elastic scattering of light by particles much smaller than the wavelength of light

(D) Inelastic scattering of light by particles changing the wavelength of light

120. In Raman spectroscopy, stokes lines result from

(A) elastic scattering of photons

(B) energy loss of photons due to interaction with molecular vibrations

(C) energy gain of photons from molecular vibrations

(D) absorption of photons by electrons

121. What is the function of a nebulizer in Atomic Absorption Spectroscopy (AAS)?

(A) To ionize the sample

(B) To convert the sample into an aerosol for analysis

(C) To separate the different elements in the sample

(D) To detect the absorption of light by the sample

122. What is the fundamental principle behind Atomic Absorption Spectroscopy (AAS)?

(A) Measurement of the intensity of light absorbed by atoms in a sample

(B) Detection of scattered light by atoms in a sample

(C) Measurement of the light emitted by atoms in a sample

(D) Analysis of the refractive index of the sample

123. What is the purpose of using a split injection in Gas Chromatography-Mass Spectrometry (GC-MS) analysis?

(A) To increase the sensitivity of the detector

(B) To prevent from overloading the column with sample

(C) To separate different compounds in the sample

(D) To enhance the resolution of the chromatogram

124. Which of the following is ***not*** a type of mass analyzer?

(A) Quadrupole

(B) Time-of-Flight (ToF)

(C) Ion Trap

(D) Chromatograph

125. In a typical FTIR spectrum, which of the following regions provides the most information about the specific functional groups present in the sample?

(A) Fingerprint region (400-1500 cm^{-1})

(B) Stretching region (1500-4000 cm^{-1})

(C) Low-frequency region (Below 400 cm^{-1})

(D) High-frequency region (Above 4000 cm^{-1})

126. Stretching vibration in molecular spectroscopy results in

(A) a change in bond angle

(B) a change in bond length

(C) a change in the overall molecular shape

(D) a shift in the center of mass of the molecule

127. What is the primary function of the initiator in an Improvised Explosive Device (IED)?

(A) To increase the explosive power of the device

(B) To provide a safe and secure casing for the explosive

(C) To trigger the main explosive charge

(D) To amplify the shockwave produced by the explosion

128. What does the acronym VBIED stand for?

(A) Very Basic Internal Explosive Device

(B) Vehicle-Borne Improvised Explosive Device

(C) Vulnerable Bomb Involved Explosive Device

(D) Volatile Bomb Integrated Explosive Device

129. If a drug has a p*K*a value of 5, what should be the ideal pH for its extraction?

(A) pH 3

(B) pH 5

(C) pH 7

(D) pH 9

130. Which of the following is the technique of choice for multi-elemental analysis?

(A) Gas Chromatography (GC)

(B) Atomic Absorption Spectroscopy (AAS)

(C) Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

(D) High-Performance Liquid Chromatography (HPLC)

131. In Solid Phase Extraction (SPE), analytes are _____ on the sorbent.

(A) adsorbed

(B) absorbed

(C) dissolved

(D) evaporated

132. Which of the following is ***not*** a procedure used in hair analysis?

(A) Gas Chromatography-Mass Spectrometry (GC-MS)

(B) High-Performance Liquid Chromatography (HPLC)

(C) Electrophoresis

(D) Ion Exchange Chromatography

133. Which of the following is the last stage of pharmacokinetics?

(A) Absorption

(B) Distribution

(C) Metabolism

(D) Elimination

134. Nitroglycerine gives which of the following colors with diphenylamine?

(A) Blue

(B) Red

(C) Yellow

(D) Green

135. 'Ecstasy' tablets primarily contain which of the following substances?

(A) Methamphetamine

(B) MDMA (3, 4-methylenedioxymethamphetamine)

(C) Cocaine

(D) Heroin

136. Which of the following is primarily measured in X-ray fluorescence (XRF) spectroscopy?

(A) Absorption of X-rays by the sample

(B) Emission of secondary X-rays from the sample

(C) The energy required to ionize electrons in the sample

(D) The wavelength of the incident X-ray beam

137. Which of the following is a key difference between Energy Dispersive X-ray (EDX) spectroscopy and Wavelength Dispersive X-ray (WDX) spectroscopy?

(A) EDX is faster but has lower resolution compared to WDX

(B) WDX is faster and offers lower resolution than EDX

(C) EDX is used for identifying chemical bonds while WDX identifies individual elements

(D) WDX does not use X-ray fluorescence

138. Which of the following techniques can be used to record an IR spectrum of a sample?

(A) Gas Chromatography

(B) Fourier-Transform Infrared (FTIR) Spectroscopy

(C) Ultraviolet-Visible (UV-Vis) spectroscopy

(D) Nuclear Magnetic Resonance (NMR) Spectroscopy

139. What is the primary purpose of the vacuum system in a mass spectrometer?

(A) To accelerate ions towards the detector

(B) To create a high-pressure environment for ionization

(C) To maintain a low-pressure environment for ion travel

(D) To filter unwanted ions from the mass spectrum

140. Which of the following mass analyzers is based on the principle of ion separation according to their mass-to-charge ratio (m/z)?

(A) Quadrupole mass analyzer

(B) Ion trap mass analyzer

(C) Time-of-Flight (ToF) mass analyzer

(D) All of the above

141. What is the principle behind the Time-of-Flight (ToF) mass analyzer?

(A) Ions are separated based on their velocities

(B) Ions are accelerated through an electric field and separated by their m/z ratio

(C) Ions are trapped and analyzed in a specific region

(D) Ions are passed through a magnetic field and separated by their m/z ratio

142. Who is considered as the father of forensic entomology?

(A) Dr. William Bass

(B) Dr. Bernard Greenberg

(C) Dr. Erich M. K. Drexler

(D) Dr. Howard Marks

143. The sum of deviations will be zero, if it is taken from

(A) the mean

(B) the median

(C) the mode

(D) the range

144. What is the normal pH range of fresh milk?

(A) 6·2–6·4

(B) 6·5–6·7

(C) 7·0–7·2

(D) 5·5–5·7

145. Which of the following reagents is used in the neutralizer test for detecting added neutralizers (e.g., sodium carbonate) in milk?

(A) Bromothymol blue

(B) Nessler's reagent

(C) Rosolic acid

(D) Benedict's solution

146. Which of the following is an example of a primary explosive?

(A) TNT (Trinitrotoluene)

(B) RDX (Research Department Explosive)

(C) Mercury fulminate

(D) Ammonium nitrate

147. What is the active ingredient in cannabis that causes psychoactive effects?

(A) Cannabinol (CBN)

(B) Tetrahydrocannabinol (THC)

(C) Cannabidiol (CBD)

(D) Delta-8-THC

148. What is the primary toxic effect of methanol poisoning?

(A) Liver failure

(B) Optic nerve damage

(C) Respiratory depression

(D) Kidney failure

149. The addictive potential of cocaine is primarily due to

(A) enhancement of serotonin release

(B) blockage of dopamine reuptake

(C) inhibition of acetylcholine receptors

(D) suppression of GABA activity

150. Which of the following gases is commonly implicated in sewage-related deaths?

(A) Hydrogen sulfide

(B) Carbon dioxide

(C) Phosphine

(D) Ammonia